

Emergency procedures:

The emergency shutdown procedure is stated in the manual and supplied in laminated form at the time of installation of the system. We will go through each step with you, but it is important that you understand and know the procedure, like a fire drill.



Maintenance Procedure:

The maintenance of the system has weekly, quarterly and annual routine checks, and are documented in the manual. Also, we maintain the system for the first year, included in the quote.

We are available 24hours a day for any queries or problems with your system.



Cooloola Solar Systems

Ph: 07 54866259 Mob: 0428775501
Ph: 07 54824302 Mob: 0417648231
Email: lynwil@spiderweb.com.au



Things
to consider
when going with
a renewable energy
power system.

Richard Henderson
Ph: 07 54866259
Mobile: 0428775501
BCSE Acc No. **FDI688**

Lynne Wilson
Ph/fax: 07 54824302
Mob: 0417648231
BCSE Acc No FDI689
Email: lynwil@spiderweb.com.au
Dip. Renewable Energy Technology

Things you should know when going with a renewable energy system.

1. Biggest restraint is budget.
 - Budget limits size of system
 - Rebate can help
 - i. Who sends in the rebate forms
 - ii. What is required when sending in the rebate form
 - Grid connect
 - Approved designer/installers
2. Loads and load Assessment calculations
3. Position of panels
 - Support structure
 - Facing north
 - Peak sun hours
 - Shading
4. Control room
 - Own power manager
 - Full control
 - Can be built before house
 - Can wire house if not connected to the grid
 - All systems must be inspected by a licensed electrician
 - Photographed for rebate
6. Understanding loads and load requirements
 - Inverter
 - Startup currents
7. Understanding depth of discharge
 - batteries
 - life span of batteries



9. Upgrading

- Panels
- Rebate

10. Maintenance procedures

11. Emergency procedures

Days Autonomy:

The 'days autonomy' is the number of days the system can deliver daily power requirement without having any energy input from the panels or the generator, or any other source. This directly relates to the capacity of the batteries needed for the system. Generally, 5 days autonomy is desired.



A **correctly sized** battery bank is vital to the proper functioning of your solar system. Compromising on the battery bank can lead to poor performance and dissatisfaction with the entire system.

The rebate scheme doesn't allow for any second hand items.

The battery charger

The charger is necessary to top the batteries during times of inclement weather and excessive power use.

The charger is sized according to the size of the generator and battery capacity.



The inverter:

Almost all loads/appliances in a typical home operate at 240VAC

The inverter is a basic component of the PV system, it converts DC power from the batteries to 240VAC power as needed.

Today's inverters are 85-90% efficient and very reliable.

True sinewave inverters are used in the systems because they produce a power identical to the grid and will operate any appliance within their power range.



The inverter is sized according to the load demand.

1. Budget

The biggest restraint of going with a renewable energy system most often is the budget. This limits the size of a system. A renewable energy power system is an expensive project, but is basically a one-of upfront cost, and until 2006 the government will cover half the cost of the system, providing the system meets the requirements.

If the budget doesn't reach the cost of an ideal system, this generally means a longer generator run time.

We can usually give four system sizing estimates with corresponding costs. These cover the ideal size of a system to meet the ultimate load requirements of the client, with the maximum panel wattage, the next system size incorporates smaller size panels (wattage) with some cut backs on what can be run on the system. No electric kettles, toasters, etc. The third system size has the same size panel, but less of them, and appliances such as the washing machine and vacuum being run on the generator. The fourth system has even smaller panel wattage and maybe even be a lesser number of panels.



A number of panels in a system upgrade, installed on the roof of the bathroom.

The Renewable Energy Diesel Replacement Scheme is to encourage the use of renewable energy and reduce the use of diesel in areas not connected to mains electricity grid before or at the time the system or equipment is installed, and the system being installed must be in Queensland.

Who handles the rebate form?

The rebate preliminary assessment form can be sent to the EPA (Environmental Protection Agency) by either the client or the designer/installers. This can be decided by the client, but we are quite happy to do it for you.

The preliminary assessment form:

This will require

- Quote(s) from suitably qualified and experienced designer/installers
- a load assessment (household electricity load summary)
- applicant information
- power supply system information
- Survey information
- Statutory declaration (must be signed by a Justice of the Peace and applicant.)
- Evidence of a maintenance plan
- Proof of compliance with condition 6 of the Renewable Energy Diesel Replacement Scheme (e.g. proof of ownership of land)
- System Design and Performance Statements from Contractor(s) (proforma issued by EPA)

Approved Designer/installers

The EPA requires the designer/installers are competent and qualified with relevant experience. The approved designer/installer will have accreditation endorsed by the SEIA/BCSE.

The Load Assessment:

The entire system is designed according to the daily load requirements of the client. This is calculated by assessing each appliance, its wattage and length of the time each day the appliance is used. A typical load assessment is shown below. We have included a load assessment sheet for you to calculate your own daily load. A system is designed from the daily load demand (load assessment), from this figure we are able to correctly size the panel wattage and number, battery amp-hour capacity etc.

The system design table can give an indication of the system size fitting your load. The Government rebate covers half the cost of the system, including the support structures provided the application meets the requirements of the guidelines.



Batteries aren't 100% efficient (usually 85% to 90%).

The state of charge of the batteries is determined by reading specific gravity (SG) of the battery acid (electrolyte) using a hydrometer. One is supplied as part of the equipment and if needed, we will show you how to read it. This is a necessary part of the maintenance procedure.

Monitoring the battery state of charge is the single largest responsibility of the system owners. The battery capacity (SOC) should be kept above 50% as much as possible to maximise battery life.

When refilling batteries use only distilled water. You should never have to add acid.

As the batteries charge they create bubbles of gas (hydrogen). This is the reason for the ventilation and the periodic need to add water as the gassing uses water in the reaction.

This will normally need to be topped up only once every six months.

Two maintenance system check ups are included in the design quote, more can be arranged.

The Regulator:

This is sometimes referred to as the charge controller.

The Plasmatronic regulator we use is capable of 30 days data logging and can be connected to a computer.

The main function of the charge controller is to regulate the energy from the PV modules to fully charge the batteries without permitting overcharge and preventing reverse current flow at night.

One of the extra features of the Plasmatronic controller is automatic control of lights, generator, water pump or other loads.

A shunt and adaptor is an optional extra with the regulator, it allows the regulator to monitor the power used by the system. We advise you have one installed with the system, then the regulator can provide a full picture of the system's performance.



The PL60 Regulator with the regulator, array, charger and batteries fuses.

The Batteries:

The batteries are simply a storage vessel for the direct current (DC) power produced by the charging source (solar modules, wind generator, micro-hydro or generator).

A cycle on a battery bank occurs when you discharge the battery and then charge it back up again to the same level.

The depth of discharge (DOD) is how deep the battery is discharged.

The state of charge (SOC) is the capacity left in the battery.

Automotive batteries are not suitable for the deep cycling that is required by a Stand Alone System (SAS).

To maximise the battery life, deep cycle batteries (tubular plate construction) are used, with a designed daily depth of discharge from 10 to 15%. This will greatly enhance the battery life time, 15 - 20years.

A Typical Load Assessment

LOADS	QUANTITY	VOLTS	WATTS	NUMBER OF HOURS	WATT/HOURS
Lights	1	240	75	5	375
TV	1	240	65	3	195
RADIO	1	240	70	2	140
CD PLAYER	1	240	11	1	11
FANS	1	240	65	1	65
DAM PUMP	1	240	430	0.25	107.5
TANK PUMP	1	240	530	0.14	74.2
HAIR DRYER	1	240	1200	0.05	60
COMPUTER	1	240	360	0.14	50.4
BEDROOM LIGHT	1	240	50	1	50
SINK LIGHT	1	240	50	0.5	25
FRIDGE FREEZER	1	240	300	10	3000
				Total	4153



The Control Room

As the owner of a solar system you become your own power manager, totally in control of the way the electricity produced by the sun, is used.

The solar system has a control room/enclosure that houses the equipment necessary to control the system

The equipment consists of the inverter, the batteries inside the battery box, (complete with battery safety signs and crossflow ventilation), the charger, the regulator and the fuses and kilowatt-hour meters. This room must be lockable, vermin proof and have adequate ventilation.

The control room, often, called the equipment shed, and the whole solar system can be built and installed before the house is built. This is sometimes helpful as electricity is required to build the house. The array doesn't have to be mounted on the roof of the house.

Cooloola Solar Systems can wire the house for normal 240V. To be eligible for the scheme, the property must not be connected to the main electricity grid before or at the time the system or equipment is installed. All work must be inspected by a license electrician (which we can arrange) and can be done at the time of installation if the building is finished to a certain standard.

All work must be photographed for the EPA rebate, but this will be done by Cooloola Solar Systems. A copy of the system photographs are included in the system manual which is supplied at the completion of the installation. We will instruct the owners in the operational, maintenance and emergency procedures.



The table on page 6 gives a range of Average Daily loads in watt hours per day.

This list also gives you the ideal size of batteries that would be used in a system of that load size along with the number of panels and the various configurations. The regulator is chosen to suit the size of array. Please note; the inverter size depends on the size of the load items and what will be running at any one time. A battery charger and panel frames are among the other items not included in this list. The prices are only for the items mentioned in the table, other items such as the inverter, the battery charger, the panel frames, the electrical hardware, delivery, installation and maintenance checkups are not included in the prices.



Sitting at lunch with a cuppa during the solar installation.

